

Name and brief description of initiative**NASA Digital Astronaut**

(N.B. This initiative is still in a planning phase and is not yet a funded element of the NASA Human Research Program.)

The Digital Astronaut is a mathematical modeling and simulation system embodying the physiological, mechanical and fluid homeostatic aspects of the space traveler. Upon completion, it will consist of a modularized, top-down whole-body physiological and mechanical representation of the human implemented on a high-performance computer. The Digital Astronaut system will also include detailed modules representing fundamental biological events in those physiological components most actively involved in the human adaptation to space travel.

Brief description of goals of initiative:

The Digital Astronaut will enable: a more complete understanding of the sparse data sets available from space flight by providing a framework for comprehensive analysis of the data in a consistent way; an ability to interpret the multidisciplinary data that has been and will be gathered during Earth-based analogue studies such as bed rest and the capability to better plan such studies; and the ability to estimate or predict the effect of various events on the human during a space mission, including the effectiveness of multiple simultaneous countermeasures designed to maintain an appropriate standard of health.

Contact information: Ronald J. White, Ph.D. 281-244-2025; white@dsls.usra.edu

Website address of initiative: This initiative is still in a planning phase and has not been launched at this time. No website is available.

Brief description of biomedical informatics and computational biology components and their goals:

This initiative will involve: (1) the development of a central integrating core modeling backbone that supports a modular, component-based approach to individual physiological and mechanical system model development and that provides a dynamic plug-n-play environment for the modules; (2) the development of a layered set of physiological modules appropriate for the study of space-flight and low-gravity environments as well as for special Earth-analogue environments; (3) the development/adoption of an appropriate physiological ontology enabling exchange and interchange of the physiological modules; and (4) the development or adaptation of data mining tools that would enable the relevant data sets to be located in the various distributed space-flight related data archives.

Brief description of resources and tools available for sharing:

Software developed under this initiative will be open source, to the greatest extent possible. This is particularly relevant to the development of the physiological modules.

Brief description of integrative efforts:

Standard ontologies/terminologies: It is intended to utilize standard physiological ontologies and terminologies to the greatest extent possible.

Interactions with other initiatives: The only funded activity currently related to this initiative was selected as part of the multi-scale modeling program developed by the Interagency Modeling and Analysis Group. However, the initiative has much in common with a variety of other current federal programs (see Figure 1)

Opportunities for collaboration or synergy with the NCBCs:

Numerous opportunities exist for future collaboration and synergy. It is intended to develop this initiative in a cost-effective manner by working collaboratively with the various Agencies already investing in this general area of model development. More details will be available as the initiative is developed.

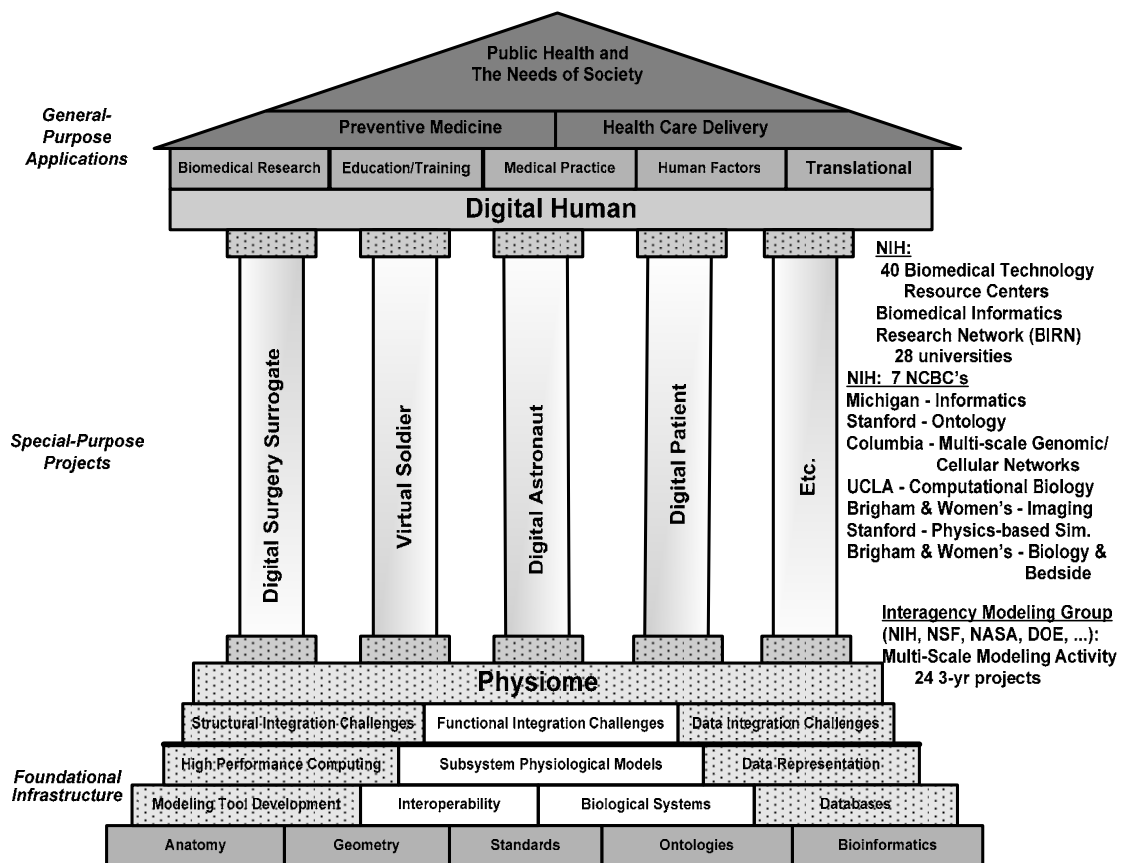


Figure 1. The general issues involved in modeling the whole human and some of the governmental programs addressing those issues.

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